

The Trends of Computer-Supported Collaborative Learning in Two Decades

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Abstract: Computer-supported collaborative learning (CSCL) has undergone significant advancements in the past two decades, revolutionizing the way learners engage with educational content and peers. This abstract explores key trends in CSCL, including the evolution of online communication and collaboration platforms, the impact of mobile technologies, the integration of data analytics, and the emergence of virtual reality (VR) and augmented reality (AR) environments. Additionally, the ongoing pandemic has accelerated the adoption of online and blended learning models, further shaping CSCL. These trends have transformed collaborative learning, allowing learners to exchange ideas, co-create knowledge, and engage in meaningful discussions. The utilization of data analytics enables personalized instruction and targeted support, enhancing learners' engagement and motivation. Immersive VR/AR environments promote active participation and deeper learning. Looking ahead, hybrid models combining face-to-face and online collaboration are likely to shape the future of CSCL. As instructional practices adapt and technology advances, creating engaging and effective learning environments remains a crucial focus in CSCL.

Keywords: Collaborative learning, Computer-supported collaborative learning (CSCL), Cooperative learning, learning environments.

1. Introduction

Computer-supported collaborative learning (CSCL) is a prominent research area in 21st-century education. It emphasizes using computer technologies to enhance collaborative learning among learners (Hod & Sagy, 2019). Through computer-based tools like online discussion forums, wikis, and virtual environments, learners engage in collaborative activities such as problem-solving and knowledge sharing (Jung, Shin, & Zumbach, 2021; Lämsä et al., 2021). CSCL recognizes the vital role of social communication and collaboration in effective learning and leverages technology to facilitate these processes (Hernández-Sellés, Muñoz-Carril, & González-Sanmamed, 2019). Drawing from education, psychology, and computer science, CSCL is implemented in diverse educational settings, including traditional classrooms and online platforms across various education levels (Radkowsch, Vogel, & Fischer, 2020).

Technological advancements have underscored the significance of CSCL environments in education (Wang & Hwang, 2012). This has led to new research questions and perspectives in areas such as higher education, K-12 instruction, special education, and workplace training (Lämsä et al., 2021). CSCL in programming education, for example, promotes teamwork, communication, autonomous learning, and problem-solving skills, while acknowledging

challenges like technical limitations and students' social and learning abilities (Cheng et al., 2022).

2. Research results

By analyzing the top CSCL articles spanning from 1995 to 2023, this study has unveiled substantial findings, encompassing a total of 1068 studies. Notably, Ertmer et al. (2012) authored the most cited articles. The United States emerged as the leading contributor in terms of the number of publications, as depicted in Figure 1. Springer Nature stood out as the most prominent publisher, as indicated in Figure 2. The International Journal of Computer-Supported Collaborative Learning featured prominently with the highest number of studies, as illustrated in Figure 3. Within the realm of authors, Frank Fischer held the distinction of being the most cited, with co-authors such as Karsten Stegmann and Armin Weinberger also making notable contributions, as highlighted in Figure 4. The University of Hong Kong emerged as the most frequently affiliated institution, alongside co-affiliated institutions like Open University Netherlands, University of Oulu, and NTUST, as demonstrated in Figure 5. Notable keywords that gained popularity included computer-supported collaboration, cooperative learning, collaborative learning, computer-mediated communication, and interactive learning environments, as showcased in Figure 6. Quantitative research methods predominated throughout the analyzed articles. The primary focus of the studies was on higher education students as the most studied participants. Notably explored were collaborative learning strategies for curriculum design, while the prevalence of tablet computers as a subject of discussion was also evident across the articles.

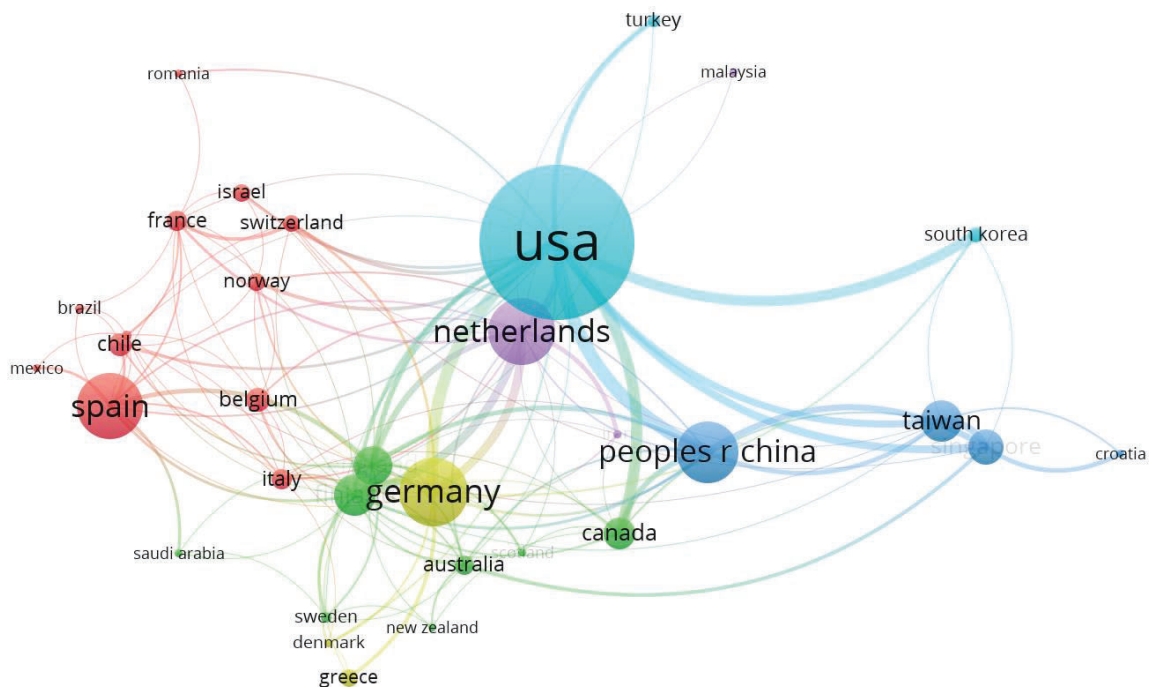


Figure 1. The leading countries.

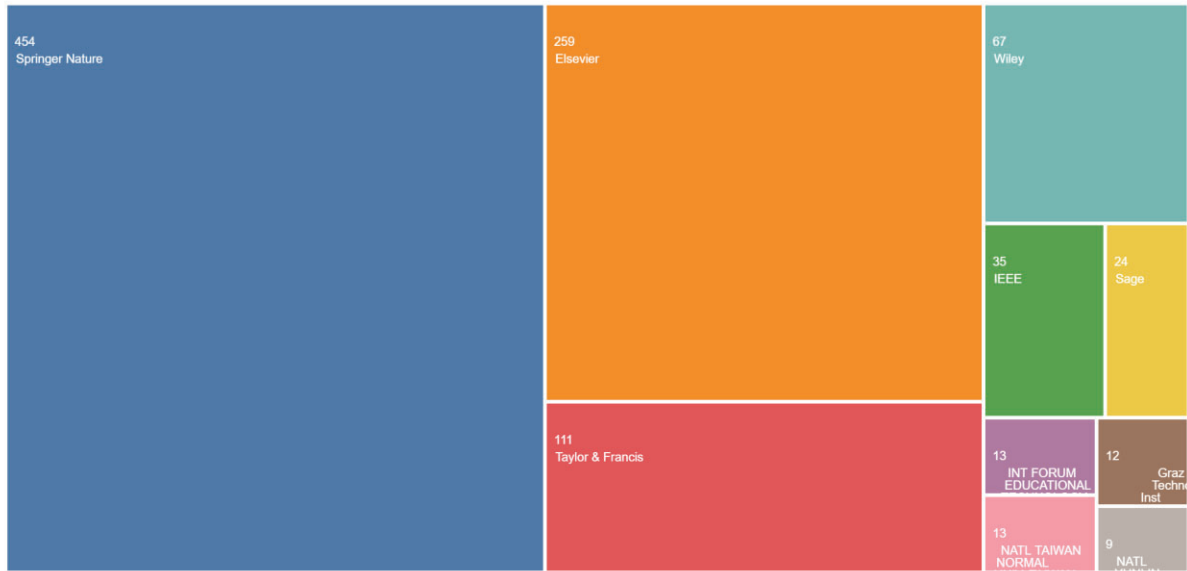


Figure 2. The most publisher.

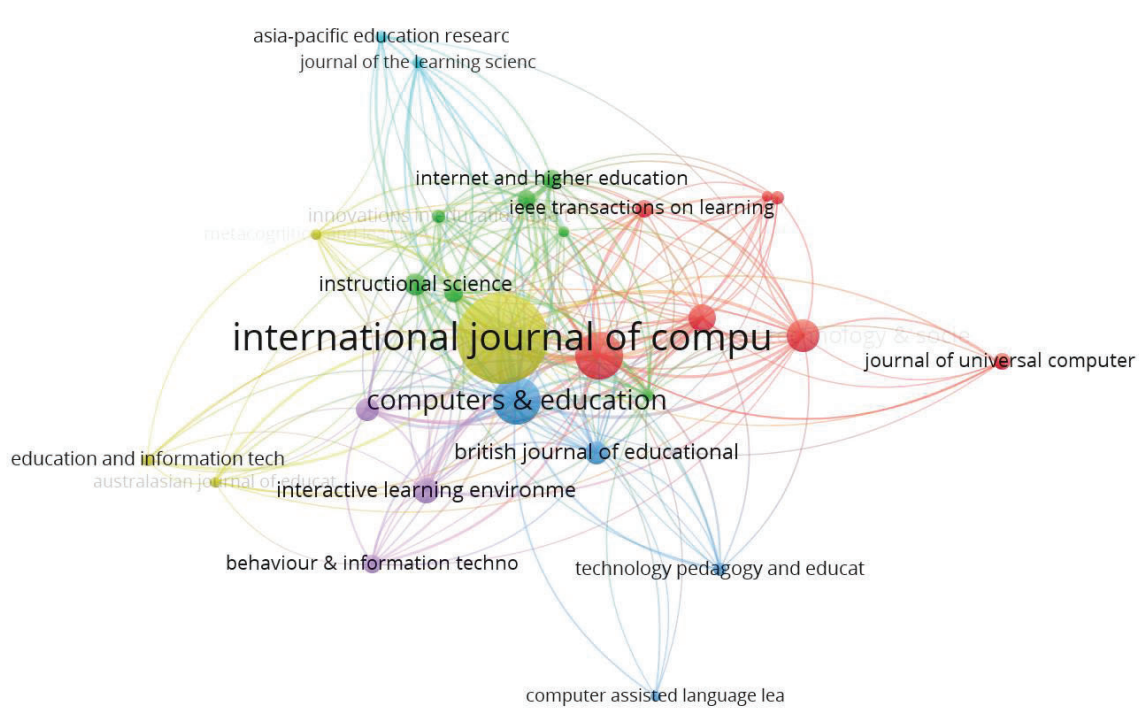


Figure 3. The most published Journal.

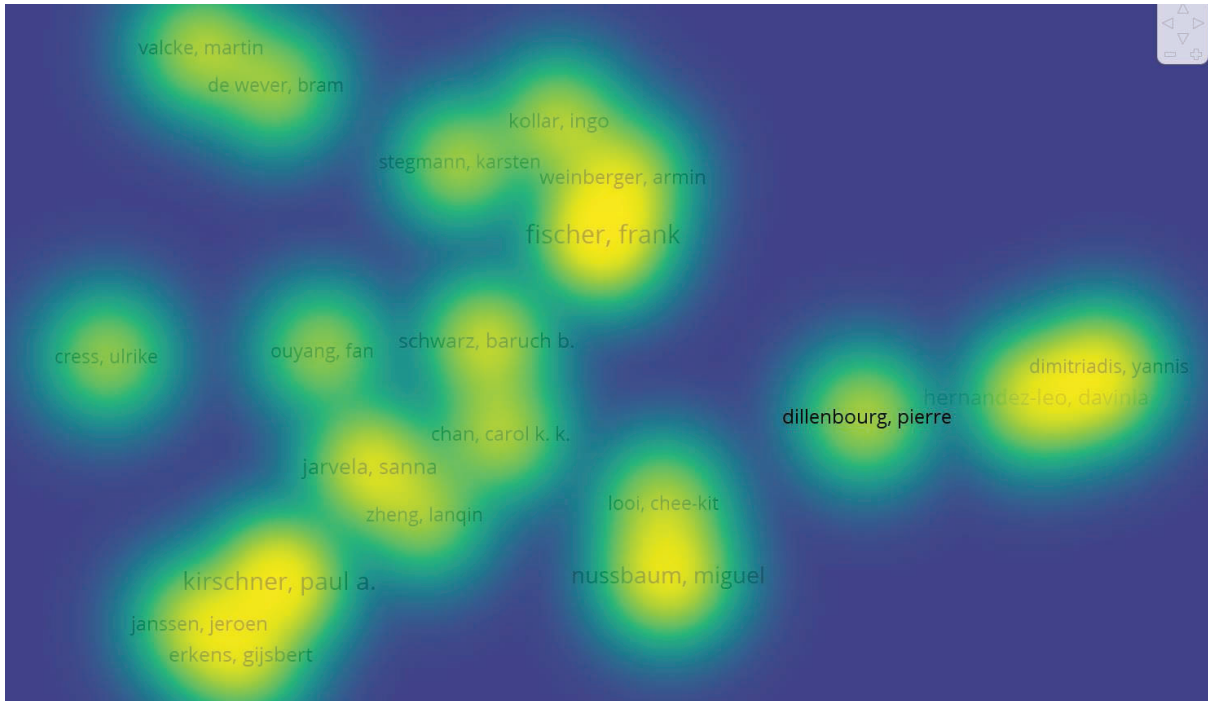


Figure 4. The most published authors.



Figure 5. The most published institution.

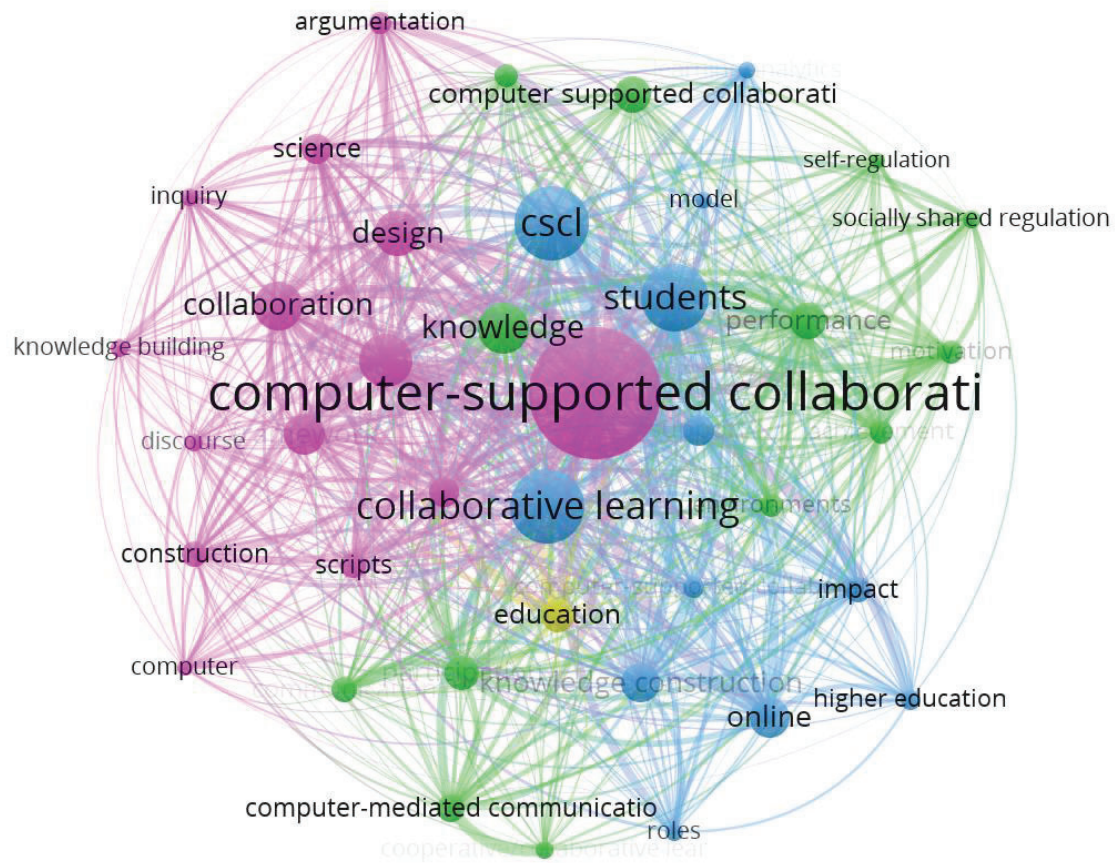


Figure 6. The most published key topics.

3. Discussion and conclusion

Recent CSCL research has focused on the use of learning devices, particularly tablet computers, to enhance CSCL competencies and learning outcomes. It has also emphasized leveraging computer-mediated communication and various tools for collaboration and interactive education. Educational institutions must adapt to technological advancements to equip learners with the necessary information and communication technology skills. CSCL research in education highlights the importance of collaboration, technology, and the broader impact of CSCL across different disciplines.

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